

Course Title: Microprocessors  
Date: January 2013 (First term)Course Code: EC21  
Allowed time: 3 hrsYear: 2<sup>nd</sup>  
No. of Pages: (2)

Answer the following questions

Problem number (1) (18 Marks)

[a] Put (✓) or (x), then write correct statement (10 Marks)

- ~~1~~ 1) The code segment is limited to 64 Kbytes in 80386.
- ~~2~~ 2) In real mode, segments can begin at any location in the memory system.
- ~~3~~ 3) PUSH BX is equivalent to PUSH EBX
- ~~4~~ 4) MOV AX, DL
- ~~5~~ 5) STD
- ~~6~~ 6) MOV ES, DS
- ~~7~~ 7) REP STOSB
- ~~8~~ 8) AND AL, BL
- ~~9~~ 9) LES BX, CAT
- ~~10~~ 10) LEA CX, [EB] [BX]
- ~~11~~ 11) IN DX IN AX, DX
- ✓ 12) PUSH 73H

[b] Draw the internal architecture of the microprocessor 80286 then describe the use of all registers. (8 Marks)

Problem number (2) (17 Marks)

[a] For the following instructions determine the data addressing mode and define its function. (8 Marks)

- Direct 1) MOV [1234H], BX
- Reg 2) DIV CH
- Base + Index 3) ADD CL, [BX + DI]
- relative reg 4) MOV ARRAY[BX], AX
- reg indirect 5) MOV [BX], DH

[b] Comparison between: (9 Marks)

- 1) The real mode operation and the protected mode operation.
- 2) The 16-bit instruction mode and the 32-bit instruction mode.
- 3) LOOP instruction and JMP instruction.



Problem number (3) (20 Marks)

- [a] In a machine language instruction, what is specified by the MOD field, the D and W bits found in some machine language instructions. (6 Marks)
- [b] If a MOV DI, [BX + SI + 30<sub>H</sub>] instruction appears in a program, what is its machine language equivalent? (6 Marks)

Op-code MOV is 22<sub>H</sub>

R/M code	Addressing mode	Code	REG field
000	DS: [BX + SI]	011	BX
001	DS: [BX + DI]	110	SI
111	DS: [BX]	111	DI

- [c] Describe the operation of each of the following instructions and the content of the destination operand in each instruction after execution assuming the initial values are DS = 0200H, BX = 4F82H (8 Marks)

4F83 1) INC BX  
 BH = 2F / BL = 82 2) SUB BH, 20<sub>H</sub>  
 93E0 3) ROR BX, 2  
 4082 4) AND BX, F0FF<sub>H</sub>

Problem number (4) (20 Marks)

- [a] Suppose that DS = 0400H, BX = 0300H, SS = 0200H, SP = 0001H, and DI = 0400H. Determine the memory address accessed by each of the following instructions, assuming real mode operation: (7 Marks)

05235 1) MOV CX, [1234<sub>H</sub>]  
 11FF 2) PUSH BX  
 04301 3) MOV DX, [BX]  
 04300 4) INC BYTE PTR[BX]

- [b] Explain the meaning of the following instructions: (13 Marks)

1) DATA 1000H .MODEL SMALL  
 all bit 2) PUSH A  
 BX ← offset 3) MOV BX, OFFSET DATS  
 mov S=1 4) CMOVS BX, DX  
 5) OUT DX, AX  
 SI ← 6) OUTSB  
 7) DATAS DW 20 DUP(?)  
 DX ← AX ← AX \* DI 8) MUL DI